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Phase equilibria modelling and zircon dating for Precambrian metapelites from Xinghuadukou Group in Lvlin Forest of Erguna Massif, NE China

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Xinghuadukou Group, the basement metamorphic complex of Erguna Massif in NE China, is considered to be Mesoproterozoic with Sm-Nd age of 1157±32 Ma. However, the new zircon data from these metamorphic supracrustal rocks in Lvlin Forest show that they formed in Neoproterozoic with the age of ∼800 Ma. Old zircon age with 2.5 Ga, 2.0 Ga and 1.8 Ga, indicate that the Erguna Massif had an affinity to both Columbia and Rodinia continents. Furthermore, we also present ∼500 Ma metamorphic age in micashists and ∼500 Ma age of adjacent granitoids that might have thermally influenced its surrounding.
No detailed studies have been undertaken on the metamorphic evolution of the Xinghuadukou Complex. The typical paragneissic mineral assemblage of garnet sillimanite mica schist is Grt+Sil+Bt+Mus+Qtz±Kfs. (Zhou et al., 2011) proposed that the Xinghuadukou Complex appears to have undergone similar granulite facies metamorphic conditions based on the similarity of mineral assemblages to the Mashan Complex in the Jiamusi Massif, NE China. However, the new phase equilibria modelling result shows that these rocks are high amphibolite facies product with ∼650[U+2103]. We can easily find K-feldspar formed by partial melting due to the consuming of muscovite. Also the remaining muscovite is directly connected with a fluid channel in thin sections which indicate that the remaining muscovite formed from retrograde with the existence of fluid. The zoned garnet has low MgO and high CaO content in rims and high MgO and low CaO content in core. It seems that this garnet has high pressure and low temperature (HP-LT) in rims and low pressure and high temperature (LP-HT) in core which would point to an anti-clockwise metamorphic evolution.

Zhou, J.B., Wilde, S.A., Zhang, X.Z., Zhao, G.C., Liu, F.L., Qiao, D.W., Ren, S.M. and Liu, J.H., 2011b. A> 1300km late Pan-African metamorphic belt in NE China: new evidence from the Xing'an block and its tectonic implications. Tectonophysics, 509(3): 280-292.